

Purpose of Collider-Accelerator Department (C-AD) Safety Assessment Document (SAD)

The purpose of the C-AD SAD is not only to detail the hazards identified but also to demonstrate that a rigorous study of C-AD activities was completed and that all significant hazards were identified. The SAD describes in sufficient detail all significant hazards from and controls for operation of C-AD facilities listed in Table 1. The SAD provides details necessary to determine the appropriateness of the Accelerator Safety Envelopes (ASEs) for routine operations of facilities listed in Table 1. Pertinent information is referenced; however, referenced documents such as NEPA documents or prior SADs are supplemental to the C-AD SAD. The C-AD SAD itself contains sufficient summary information to permit an appropriate evaluation of C-A Department facilities without necessarily obtaining the referenced information.

Table 1 Facilities Included in the C-AD SAD

Facility	Existing Safety Analysis Documents
Linac	http://www.cadops.bnl.gov/AGS/Accel/SND/SAR.PDF
Tandem Van de Graaff	http://www.cadops.bnl.gov/AGS/Accel/SND/tvdg_ttb_usi.htm
Tandem to Booster Line	http://www.cadops.bnl.gov/AGS/Accel/SND/tvdg_ttb_usi.htm
Booster	http://www.cadops.bnl.gov/AGS/Accel/SND/booster_sar.htm
Booster Applications Facility	http://www.cadops.bnl.gov/AGS/Accel/SND/baf_sad.htm
Alternating Gradient Synchrotron	http://www.cadops.bnl.gov/AGS/Accel/SND/SAR.PDF
Fixed Target Beam Lines and Experiments	http://www.cadops.bnl.gov/AGS/Accel/SND/SAR.PDF
AtR Line	http://www.cadops.bnl.gov/AGS/Accel/SND/AtR-SAD.pdf
Relativistic Heavy Ion Collider	http://www.cadops.bnl.gov/AGS/Accel/SND/rhic_sad.htm
Relativistic Heavy Ion Collider Cryogenic System	http://www.cadops.bnl.gov/AGS/Accel/SND/CryoSAD/CryoSADContents.pdf
Collier Experiment Halls and Experiments	http://www.cadops.bnl.gov/AGS/Accel/SND/rhic_sad.htm

Content of the C-AD SAD

The SAD identifies hazards and associated on-site and off-site impacts to the workers, the public and the environment from C-AD facilities for both normal operations and credible accidents. Although the SAD does not list and describe every hazard at C-AD facilities, it is sufficiently detailed to provide the reader with confidence that C-AD has performed a comprehensive hazard analysis. The amount of descriptive material and analysis presented is related to both the complexity of the facility and the nature and magnitude of the hazards. In addition, the SAD provides an understanding of radiation risks to the workers, the public and the environment.

The SAD provides appropriate documentation and detailed description of engineered controls, such as interlocks and physical barriers, and administrative measures, such as training, taken to eliminate, control or mitigate hazards from operation. It demonstrates that controls are sufficient to satisfy requirements and manage identified conditions associated with hazards. With the exception of radiation, risk associated with specific hazards was not quantified. Instead, C-AD documented the method used to mitigate the hazard to the extent prescribed by applicable requirements, codes or consensus standards.

The SAD includes or references a description of the C-A Department management organization, and the function and location of each C-AD facility in addition to details of major components and their operation. The descriptions are of sufficient depth and breadth that a reviewer familiar with accelerator operations but unfamiliar with a particular C-AD

site or a particular C-AD accelerator can readily identify potential hazards and populations or environments at risk.

The SAD was prepared as a single document addressing the hazards of the entire system of facilities within the purview of the C-A Department. It covers facilities such as injectors, accelerators, experimental halls, experiments and their associated targets, and the collider. An important point is that the SAD comprehensively describes the entire set of facilities in an integrated fashion. Relationships between various operations are clearly identified and described.

The C-AD SAD followed the generally accepted SAD format listed in the ASO Guide:

Chapter 1: Introduction

This chapter provides a basic understanding of the function of the integrated facilities and the protection afforded the public and worker's health and safety, and the protection of the environment.

Chapter 2: Summary/Conclusions

The summary provides an overview of the results and conclusions of the analysis contained within the SAD. Comprehensiveness of the safety analysis and appropriateness

of Accelerator Safety Envelopes are addressed. It is also within this chapter that exemption of the uranium block shield in Building 912 is identified.

Chapter 3: Site, Facility and Operations Description

This chapter accurately depicts the land, water, air and wildlife environment within which C-AD facilities operate, individual facility characteristics that are safety-related and the methods to be used to operate the accelerators, the collider and the experiments. The following items are addressed in this chapter:

- Site geography, seismology, meteorology, hydrology, demography and adjacent facilities that may affect or may be affected by C-AD
- Design criteria and as-built characteristics for components with safety-significant functions
- Features that minimize the presence of hazardous environments such as those that ensure radiation exposures are kept ALARA during operation and maintenance
- BNL and C-AD organizational and management structures and a delineation of responsibilities for safety
- The function of engineered and administrative controls both for routine operation and for emergency conditions
- Critical operational procedures to prevent or mitigate accidents
- Design criteria and characteristics of experimental equipment, systems and components having safety-significant functions

Chapter 4: Safety Analysis

This chapter documents the analysis, including the systematic methods used to identify and mitigate hazards. Hazardous materials, energy sources and potential sources of environmental pollution including radiological hazards are characterized and quantified. Coupled with the identification of hazards is a description of the controls that are employed for their mitigation. The description of controls includes discussion of credible challenges and estimates of consequences in the event of corresponding failure.

A discussion of the risk to workers, the public and the environment from radiation is included. However, an effort to assess risk was not considered necessary for other hazardous environments. In addition, the methods to ensure radiation exposures are kept ALARA during operation, maintenance and facility modification are presented in this chapter.

Chapter 5: Accelerator Safety Envelope

This chapter consists of the engineered and administrative bounding conditions within which the BNL and C-A Department operate the C-AD facilities. The actual ASEs are separate documents that are approved by DOE-BAO.

Chapter 6: Quality Assurance

This chapter describes the quality assurance program applied at the C-AD, focusing upon activities that influence protection of the worker, the public and the environment.

Chapter 7: Decommissioning and Decontamination Plan

A description of structural and internal features, which facilitate decommissioning and decontamination, are provided in this chapter. Waste management of radiological and hazardous material generation from the decommissioning and decontamination operation is discussed within the context of DOE requirements currently in existence.

Chapter 8: References/Glossary/Acronyms